

What is claimed is:

1. An apparatus for positioning back-up pins on a support plate for supporting a circuit board thereon, the apparatus comprising:

a back-up pin plate having a substantially planar upper surface for positioning back-up pins thereon;

a back-up pin stand for placing back-up pins therein;

a camera for taking an image of a surface of the circuit board to be supported by a plurality of back-up pins;

a control unit configured to display at least one image of the circuit board taken by the camera, the image including a first image representative of a portion of the surface of the circuit board and a second image representative of substantially the entire surface of the circuit board, the control unit further configured to allocate a plurality of support locations for supporting the circuit board while viewing the first image and the second image of the circuit board; and

a transfer member adapted to transfer a plurality of back-up pins from the back-up pin stand to the allocated support locations on the back-up pin plate.

2. The apparatus of claim 1, wherein at least a portion of the back-up pin plate includes a magnetizable material, and each of the back-up pins includes a magnetic portion for attaching onto the back-up pin plate by a magnetic force between the back-up pin plate and the back-up pin.

3. The apparatus of claim 1, wherein the camera is a line charge-coupled device camera.

4. The apparatus of claim 1, wherein the first image is a real-time image taken by the camera and the second image is an image composed of a plurality of the real-time images taken by the camera.

5. The apparatus of claim 1, wherein the control unit includes a display screen for displaying the images of the circuit board taken by the camera.
6. The apparatus of claim 5, wherein the control unit further includes a user interface for allowing a user to control the allocation of the support locations and positioning of the back-up pins.
7. The apparatus of claim 6, wherein the control unit further includes an input device for the allocation of the support locations.
8. The apparatus of claim 7, wherein the input device of the control unit is a mouse configured to move a mouse pointer in the display screen displaying the image of the circuit board and select the support locations with the aid of the displayed screen.
9. The apparatus of claim 6, wherein the user interface comprises a back-up pin type selection menu.
10. The apparatus of claim 6, wherein the user interface comprises an insert mode for the allocation of the support locations.
11. The apparatus of claim 10, wherein the user interface further comprises a remove mode for cancellation of the previously allocated support locations.
12. The apparatus of claim 10, wherein the user interface comprises a save mode for saving the allocation information in the control unit.
13. The apparatus of claim 6, wherein the user interface comprises a PCB loading mode for loading a circuit board onto the apparatus.

14. The apparatus of claim 1, wherein the back-up pin stand comprises a plurality of openings for receiving lower portions of the back-up pins.

15. The apparatus of claim 1, wherein the camera is coupled with the transfer member for moving together along a Cartesian coordinate.

16. An apparatus for positioning back-up pins on a support plate for supporting a circuit board thereon, the apparatus comprising:

a plurality of back-up pins each having a magnet portion at least a lower portion thereof;

a back-up pin plate formed at least partially with a magnetizable material and including a substantially planar upper surface for positioning the back-up pins thereon; and

a transfer member adapted to transfer a plurality of back-up pins onto support locations on the back-up pin plate for supporting a circuit board thereon.

17. The apparatus of claim 16 further comprising a back-up pin stand for placing back-up pins therein.

18. The apparatus of claim 16 further comprising a camera for taking an image of a surface of the circuit board to be supported by a plurality of back-up pins.

19. The apparatus of claim 18, wherein the camera is coupled with the transfer member for moving together along a Cartesian coordinate.

20. The apparatus of claim 18 further comprising a control unit configured to display at least one image of the circuit board taken by the camera, the image including a first image representative of substantially the entire surface

of the circuit board and a second image representative of a portion of the surface of the circuit board, the control unit further configured to allocate a plurality of support locations for supporting the circuit board while viewing the first image and the second image of the circuit board.

21. The apparatus of claim 16, wherein the back-up pins have a generally cylindrical shape with the upper portions of the back-up pins having different diameters.

22. The apparatus of claim 16, wherein the back-up pins each has a circumferential groove for providing a secure holding of the back-up pin by the transfer member.

23. The apparatus of claim 16, wherein the back-up pins each has a marking on its top surface thereof.

24. A back-up pin to be placed on a support plate for supporting a circuit board thereon in an electronic part mounting process, the back-up pin comprising:

a lower portion having a magnetic characteristic and including a planar lower surface; and

an upper portion including a planar upper surface for supporting a substrate thereon.

25. The back-up pin of claim 24, further comprising a circumferential groove along an intermediate portion thereof.

26. The back-up pin of claim 24 having a generally cylindrical shape.

27. The back-up pin of claim 26 having a diameter of about 8 mm at an upper end thereof.

28. The back-up pin of claim 26 having a diameter of about 2 mm at an upper end thereof.

29. A method of positioning back-up pins for supporting a substrate, the method comprising:

scanning an image of a surface of a substrate using a camera;

displaying a first image representative of a portion of the surface of the substrate and a second image representative of substantially the entire surface of the substrate on a monitor of a control unit;

allocating back-up pin support locations using the first and second images displayed on the monitor; and

transferring and positioning a plurality of back-up pins at the allocated locations on a back-up pin plate.

30. The method of claim 29 further comprising photographing of an image of back-up pins placed on a back-up pin stand prior to the transferring of the back-up pins.

31. The method of claim 29, wherein the first image is a real-time image taken by the camera, and the second image is an image composed of a plurality of the real-time images taken by the camera.

32. The method of claim 29, wherein the allocation of support locations is performed by selecting the locations by a mouse using the first and second images displayed on the monitor.

33. The method of claim 32, wherein the allocation of support locations is performed by selecting the locations by the mouse on the second image while viewing the first image to confirm the support locations are not interfered with any parts disposed on the substrate.

34. The method of claim 29, wherein the allocation enables selection of particular back-up pins from a plurality of back-up pins with different sizes or type.

35. The method of claim 29, wherein the scanning of the image of the substrate comprises scanning a marking formed on a top surface of the back-up pins to identify the type or dimension of the respective back-up pin.